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Nuclear Phenomena in Ustilagineæ. — Contributions such as Professor Harper presents¹ have been few, but are much needed to explain this class of plants. He studied, in particular, the germination, growth, divisions, and fusions of *Ustilago antherarum* and *U. Scabiosa*. He finds that in fusions of conidia, which are apparently caused by chemotactic stimuli, no nuclear changes take place, yet the cytoplasmic union of the cells causes them to increase in size, and gives them power to resist unfavorable conditions. It may be a primitive or degenerate sexual union.

J. B. S. NORTON.

Cell Division in Sporangia and Asci.² — Dr. Harper has contributed another very valuable investigation upon the morphology of the structures named. Among the Phycomycetes he has studied spore formation in sporangia of *Synchytrium*, *Pilobolus*, and *Sporodinia*, and for comparison, ascospore formation in *Lachnea scutellata* among the Ascomycetes, in which he was able to find stages undiscernible in his previous work on *Peziza* and *Erysiphe*.

In *Synchytrium* he regards the uninucleated cell as the vegetative body of the plant, the supervening multinucleate condition constituting, in his view, a sporangium rather than a thallus body. Cleavage by invagination of the plasma membrane follows this multinucleation, the contents of the "sporangium" being segmented, from without inward, into irregular plasma masses containing numerous nuclei. This cleavage resembles what is seen in some insect eggs. The segmentation of the protoplasm does not occur by repeated bipartitions or by the formation of walls, simultaneously, about the several nuclei. Orientation with respect to the nuclei is not evident at first, but becomes apparent later, in the final subdivision of the contents of the sporangium into uninucleate plasma segments. A shrinkage then occurs, followed by increase in size of these "protospores" and the subsequent repeated division of their single nuclei, to form from eight to twelve or more in a single "protospore." The number of them is not definite as in the ascus, but seems to depend, according to Harper, on the individual conditions of nutrition in the different "protospores."

Substantially the same cleavage process of spore formation was observed in three species of *Pilobolus* and in *Sporodinia*. There is nothing in the process of spore formation described in the Phycomy-

¹ Harper, R. C. Nuclear Phenomena in Certain Stages in the Development of the Smuts, *Trans. Wis. Acad. Sci.*, vol. xii, pp. 475-498, Pls. VIII, IX. October, 1899.

² R. A. Harper, in *Annals of Botany*, December, 1899.